Amendments to the Claims

Please amend the claims as follows:

1. (currently amended) A method of forming a dielectric layer, comprising the steps of:
annealing a polysilicon substrate in nitric oxide to form an oxide layer on the polysilicon substrate;
nitridizing the oxide layer to form a nitride layer on the oxide layer by exposure of the oxide layer to a plasma mixture of nitrogen and helium or nitrogen and argon; and
depositing the dielectric layer onto the nitride layer.

2. (currently amended) A method of forming a dielectric layer, comprising the steps of:
annealing a polysilicon substrate in nitric oxide at a temperature of less than 800°C to form an oxynitride layer on the polysilicon substrate;
nitridizing the oxynitride layer to form a nitride layer on the oxide layer by exposure of the ~~oxide~~ oxynitride layer to a plasma mixture of nitrogen and helium or nitrogen and argon; and
depositing the dielectric layer onto the nitride layer.

3. (original) The method of Claim 2, wherein the step of annealing the polysilicon substrate is at a temperature of about 700 to about 750°C.

4. (currently amended) The method of Claim 1, wherein the polysilicon substrate ~~layer~~ comprises a polysilicon selected from the group consisting of doped polysilicon, undoped polysilicon, and HSG polysilicon.

5. (currently amended) The method of Claim 1, wherein the ~~oxynitride~~ oxide layer is about 40 angstroms or less.

6. (currently amended) The method of Claim 1, wherein the ~~oxynitride~~ oxide layer is less than 15 angstroms thick.

7. (currently amended) A method of forming a dielectric layer, comprising the steps of:

annealing a polysilicon substrate in nitric oxide at a temperature of less than 800°C to form an oxynitride layer on the polysilicon substrate;

nitridizing the oxynitride layer to form a nitride layer on the oxynitride layer by exposing the oxynitride layer to a nitrogen-containing gas selected from the group consisting of a plasma mixture of nitrogen and helium, and a plasma mixture of nitrogen and argon; and

depositing the dielectric layer onto the nitride layer.

8-10. (canceled)

11. (original) The method of Claim 7, wherein the step of nitridizing the oxynitride layer is at a temperature of about 0 to about 900°C.

12. (original) The method of Claim 7, wherein the oxynitride layer and nitride layer have a combined thickness of about 10 to about 40 angstroms.

13. (currently amended) A method of forming a dielectric layer, comprising the steps of:

annealing a polysilicon substrate in nitric oxide to form an oxynitride layer on the polysilicon substrate;

nitridizing the oxynitride layer to form a nitride layer on the oxynitride layer by exposure of the oxynitride layer to a plasma generated nitrogen species selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon; and

depositing a high K dielectric layer onto the nitride layer.

14. (currently amended) The method of Claim 13, wherein ~~the dielectric material~~ the high K dielectric layer is selected from the group consisting of tantalum pentoxide, titanium dioxide, barium strontium titanate, strontium titanate, barium titanate, lead zirconium titanate, strontium bismuth tantalate, hafnium oxide, zirconium oxide, and aluminum oxide.

15. (currently amended) The method of Claim 13, wherein the high K dielectric layer comprises tantalum pentoxide.

16. (currently amended) The method of Claim 13, further comprising, after the step of forming the high K dielectric layer, annealing the high K dielectric layer in an oxidizing gas.

17. (original) The method of Claim 16, wherein the oxidizing gas is selected from the group consisting of oxygen, plasma oxygen, ozone, nitrous oxide, and mixtures thereof.

18. (currently amended) A method of forming a dielectric layer, comprising the steps of:

annealing a polysilicon substrate in nitric oxide at a temperature less than 800°C to form an oxynitride layer on the polysilicon substrate;

nitridizing the oxynitride layer in a plasma generated nitrogen to form an nitride layer on the oxynitride layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

depositing a high K dielectric layer onto the nitride layer; and

annealing the high K dielectric layer in an oxidizing ambient.

19. (original) The method of Claim 18, wherein the step of annealing the polysilicon substrate is at a temperature of about 700 to about 750°C.

20. (currently amended) The method of Claim 18, wherein the oxynitride layer has a thickness that is substantially the same before and after the step of annealing the high K dielectric layer.

21. (original) The method of Claim 18, wherein the oxynitride is about 40 angstroms or less.

22. (original) The method of Claim 18, wherein the oxynitride layer is less than 15 angstroms.

23. (currently amended) A method of forming a dielectric layer on a semiconductor substrate, comprising the steps of:

annealing a polysilicon substrate in nitric oxide at a temperature of less than 800°C to form an oxide layer having a thickness of about 40 angstrom or less on the polysilicon substrate;

exposing the oxide layer to a plasma generated nitrogen gas to form a nitrided oxide layer on the oxide layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon; and

forming a high K dielectric layer over the nitrided oxide layer.

24. (currently amended) A method of forming a dielectric layer on a semiconductor substrate, comprising the steps of:

annealing a polysilicon substrate in nitric oxide at a temperature of about less than 800°C to form an oxide layer having a thickness of about 40 angstroms or less on the polysilicon substrate;

exposing the oxide layer to a plasma generated nitrogen gas to form a nitrided oxide layer on the oxide layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

forming a high K dielectric layer over the nitrided oxide layer; and

annealing the high K dielectric layer in an oxidizing ambient;

whereby the thickness of the nitrided oxide layer after the step of annealing the high K dielectric layer is about 40 angstroms or less.

25. (currently amended) A method of forming a dielectric layer, comprising the steps of:

providing a polysilicon substrate;

heat treating the polysilicon substrate in nitric oxide to form a thin oxide layer over the polysilicon substrate;

exposing the thin oxide layer to a plasma generated nitrogen gas to form a nitride layer; and

forming a high K dielectric layer over the nitride layer on the thin oxide layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon.

26. (currently amended) A method of forming a dielectric layer, comprising the steps of:

providing a substrate comprising polysilicon;

forming an oxide layer over the polysilicon substrate by heat treating the polysilicon substrate in nitric oxide at a temperature of less than 800°C, such that nitrogen concentrates within the oxide layer at an interface between the oxide layer and the polysilicon substrate;

forming a nitride layer over the oxide layer by exposing the oxide layer to a plasma generated nitrogen gas the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon; and

forming a high K dielectric layer over the nitride layer.

27. (currently amended) A method of forming a dielectric layer, comprising the steps of:

annealing a polysilicon substrate in nitric oxide at a temperature of less than 800°C to form an oxynitride layer on the polysilicon substrate;

nitridizing the oxynitride layer to form a nitride layer on the oxynitride layer by exposing the oxynitride layer to an activated plasma generated nitrogen gas, the activated plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon ~~to form a nitrided oxide layer~~; and

depositing the dielectric layer onto the nitride ~~nitrided oxide~~ layer.

28-29. (canceled)

30. (original) The method of Claim 27, wherein the step of nitridizing the oxynitride layer is at a temperature of about 0 to about 900°C.

31. (currently amended) The method of Claim 27, wherein the oxynitride layer and the nitride layer have a combined thickness of about 10 to about 40 angstroms.

32. (currently amended) A method of forming a dielectric layer, comprising the steps of:

annealing a polysilicon substrate in nitric oxide to form an oxynitride layer on the polysilicon substrate;

nitridizing the oxynitride layer in an activated plasma generated nitrogen gas to form a ~~nitrided oxide layera~~ nitride layer on the oxynitride layer, the activated plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon; and

depositing a high K dielectric layer onto the nitride layer.

33. (currently amended) A method of forming a dielectric layer on a semiconductor substrate, comprising the steps of:

providing a substrate comprising HSG polysilicon;

annealing the HSG polysilicon ~~substrate~~ in nitric oxide at a temperature of about 700°C to about 750°C to form an oxide layer having a thickness of about 40 angstroms or less on the HSG polysilicon;

exposing the oxide layer to a plasma generated nitrogen gas to form a nitrided oxide layer on the oxide layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

forming a layer comprising tantalum pentoxide over the nitrided oxide layer; and

annealing the tantalum pentoxide layer in an oxidizing ambient;

whereby the thickness of the nitrided oxide layer is about 40 angstroms or less.

34. (currently amended) A method of forming a dielectric layer on a semiconductor substrate, comprising the steps of:

providing a substrate comprising HSG polysilicon;

annealing the HSG polysilicon ~~substrate~~ in nitric oxide at a temperature of about 700°C to about 750°C to form an oxide layer having a thickness of about 40 angstroms or less on the HSG polysilicon;

exposing the oxide layer to an activated plasma generated nitrogen gas to form a nitrided oxide layer on the oxide layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

forming a layer comprising tantalum pentoxide over the nitrided oxide layer; and

annealing the tantalum pentoxide layer in an oxidizing ambient;

whereby the thickness of the nitrided oxide layer is about 40 angstroms or less.

35. (currently amended) A method of forming a semiconductor device above a semiconducting substrate having a surface, comprising the steps of:

forming a nitrided oxynitride layer over a polysilicon substrate by annealing the polysilicon substrate in the presence of a nitric oxide at a temperature of about 700 to about 750°C to form an oxynitride layer, and nitridizing the oxynitride layer in a plasma generated nitrogen gas to form the nitrided oxynitride layer on the oxynitride layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon; the nitrided oxynitride layer having a thickness of about 40 angstroms or less;~~,~~ and

forming a dielectric layer over the nitrided oxynitride layer.

36. (currently amended) The method of Claim 35, wherein the dielectric layer~~material~~ comprises a high K dielectric.

37. (currently amended) The method of Claim 36, wherein the high K dielectric ~~material~~ is selected from the group consisting of tantalum pentoxide, titanium dioxide, barium strontium titanate, strontium titanate, barium titanate, lead zirconium titanate, strontium bismuth tantalate, hafnium oxide, zirconium oxide, and aluminum oxide.

38. (original) The method of Claim 36, wherein the dielectric layer comprises tantalum pentoxide.

39. (original) The method of Claim 36, further comprising, after the step of forming the dielectric layer, annealing the dielectric layer in an oxidizing gas, wherein the thickness of the nitrided oxynitride layer is about 40 angstroms or less.

40. (original) The method of Claim 39, wherein the oxidizing gas is selected from the group consisting of oxygen, plasma oxygen, ozone, nitrous oxide, and mixtures thereof.

41. (currently amended) A method of forming a semiconductor device above a semiconducting substrate having a surface, comprising the steps of:

forming a nitrided oxynitride layer over a polysilicon substrate by annealing the polysilicon substrate in the presence of a nitric oxide at a temperature of about 700 to about 750°C to form an oxynitride layer, and nitridizing the oxynitride layer in an activated plasma generated nitrogen gas to form the nitrided oxynitride layer on the oxynitride layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon; the nitrided oxynitride layer having a thickness of about 40 angstroms or less; and

forming a dielectric layer over the nitrided oxynitride layer.

42. (currently amended) The method of Claim 41, wherein the dielectric layer~~material~~ comprises a high K dielectric.

43. (currently amended) A method of forming a dielectric layer in a capacitor container comprising an opening formed in an insulative layer and a lower electrode comprising polysilicon formed within the opening, the method comprising the steps of:

forming an oxynitride layer over the lower electrode by annealing the lower electrode in the presence of nitric oxide;

nitridizing the oxynitride layer in a plasma generated nitrogen gas to form a nitrided oxynitride layer on the oxynitride layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon; and

forming a high K dielectric layer over the nitridized oxynitride layer.

44. (original) The method of Claim 43, wherein the step of annealing the lower electrode is at a temperature of about 700 to about 750°C.

45. (previously presented) The method of Claim 43, further comprising annealing the high K dielectric layer in an oxidizing ambient.

46. (currently amended) A method of forming a dielectric layer in a capacitor container comprising an opening formed in an insulative layer and a lower electrode comprising polysilicon formed within the opening, the method comprising the steps of:

forming an oxynitride layer over the lower electrode by annealing the lower electrode in the presence of nitric oxide;

nitridizing the oxynitride layer in an activated plasma generated nitrogen gas to form a nitrided oxynitride layer on the oxynitride layer, the activated plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon; and

forming a high K dielectric layer over the nitridized oxynitride layer.

47. (original) The method of Claim 46, wherein the step of annealing the lower electrode is at a temperature of about 700 to about 750°C.

48. (currently amended) A method of forming a capacitor, comprising the steps of:

forming a first capacitor electrode comprising polysilicon over a substrate;

forming an oxynitride layer over the first capacitor electrode by annealing the first capacitor electrode in the presence of nitric oxide;

nitridizing the oxynitride layer in a plasma generated nitrogen gas to form a nitrided oxynitride layer on the oxynitride layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon; and

forming a dielectric layer over the nitrided oxynitride layer.

49. (previously presented) The method of Claim 48, wherein the dielectric layer comprises a high K dielectric material.

50. (previously presented) The method of Claim 49, wherein the high K dielectric material is selected from the group consisting of tantalum pentoxide, titanium dioxide, barium strontium titanate, strontium titanate, barium titanate, lead zirconium titanate, strontium bismuth tantalate, hafnium oxide, zirconium oxide, and aluminum oxide.

51. (previously presented) The method of Claim 49, wherein the dielectric layer comprises tantalum pentoxide.

52. (previously presented) The method of Claim 49, further comprising, after the step of forming the dielectric layer, annealing the dielectric layer in an oxidizing gas.

53. (currently amended) A method of forming a capacitor, comprising the steps of:

forming a first capacitor electrode comprising polysilicon over a substrate;

forming an oxynitride layer over the first capacitor electrode by annealing the first capacitor electrode in the presence of nitric oxide;

nitridizing the oxynitride layer in an activated plasma generated nitrogen gas to form a nitrided oxynitride layer on the oxynitride layer, the activated plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon; and

forming a dielectric layer over the nitrided oxynitride layer.

54. (currently amended) A method of forming a capacitor, comprising the steps of:

providing a substrate comprising an overlying insulative layer and a container opening formed in the insulating layer to an active area on the substrate, and a lower electrode comprising polysilicon formed within the container opening;

forming an oxynitride layer over the lower electrode by annealing the lower electrode in the presence of nitric oxide;

nitridizing the oxynitride layer in a plasma generated nitrogen gas to form a nitrided oxynitride layer on the oxynitride layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

forming a high K dielectric layer over the nitrided oxynitride layer; and

annealing the high K dielectric layer in an oxidizing gas.

55. (currently amended) The method of Claim 54, wherein the step of forming the oxynitride layer comprises:

annealing the lower electrode in the presence of nitric oxide at a temperature of less than 800°C. to form ~~an~~the oxynitride layer having a thickness about 40 angstroms or less.

56. (currently amended) A method of forming a capacitor, comprising the steps of:

providing a substrate comprising an overlying insulative layer and a container opening formed in the insulating layer to an active area on the substrate, and a lower electrode comprising polysilicon formed within the container openings;

forming an oxynitride layer over the lower electrode by annealing the lower electrode in the presence of nitric oxide;

nitridizing the oxynitride layer in an activated plasma generated nitrogen gas to form a nitrided oxynitride layer on the oxynitride layer, the activated plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

forming a high K dielectric layer over the nitrided oxynitride layer; and

annealing the high K dielectric layer in an oxidizing gas.

57. (currently amended) A method of forming a capacitor in a semiconductor device, comprising the steps of:

providing a substrate with an opening;

forming a first conductive electrode layer within the opening; the first conductive electrode layer comprising hemispherical grain polysilicon;

forming a thin layer of oxynitride over the first conductive electrode layer by annealing the first conductive electrode layer~~electrode~~ in the presence of nitric oxide;

nitridizing the thin layer of oxynitride~~oxynitride layer~~ in a plasma generated nitrogen gas to form a nitrided oxynitride layer on the thin layer of oxynitride, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

forming an insulative layer over the nitrided oxynitride layer; the insulative layer comprising an insulating inorganic metal oxide material; and

forming a second conductive electrode layer over the insulative layer.

58. (previously presented) The method of Claim 57, wherein the insulating inorganic metal oxide material comprises a high K dielectric.

59. (previously presented) The method of Claim 58, wherein the insulating inorganic metal oxide material is selected from the group consisting of tantalum pentoxide, titanium dioxide, barium strontium titanate, strontium titanate, barium titanate, lead zirconium titanate, strontium bismuth tantalate, hafnium oxide, zirconium oxide, and aluminum oxide.

60. (previously presented) The method of Claim 58, wherein the insulating inorganic metal oxide material comprises tantalum pentoxide.

61. (previously presented) The method of Claim 57, further comprising, after the step of forming the insulative layer, annealing the insulative layer in an oxidizing gas.

62. (currently amended) The method of Claim 57, wherein the step of forming the thin layer of oxynitride~~ layer~~ comprises:

annealing the first conductive electrode layer comprising hemispherical grain polysilicon ~~polysilicon electrode~~ in the presence of nitric oxide at a temperature of about 700 to about 750°C. to form an oxynitride layer having a thickness of about 40 angstroms or less.

63-77. (cancelled)

78. (currently amended) A method of forming a dielectric layer, comprising the steps of:

thermally annealing a polysilicon substrate in nitric oxide to form an oxide layer on the polysilicon substrate; and

annealing the oxide layer in a plasma generated nitrogen gas to nitridize the oxide layer to form a nitrided oxide layer on the oxide layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

wherein upon forming the dielectric layer over the nitridized oxide layer, and exposing the dielectric layer to an oxidizing gas, the nitridized oxide layer inhibits oxidation of the polysilicon substrate.

79. (currently amended) A method of forming a dielectric layer, comprising the steps of:

thermally annealing a polysilicon substrate in nitric oxide to form an oxide layer on the polysilicon substrate;

annealing the oxide layer in a plasma generated nitrogen gas to nitridize the oxide layer to form a nitrided oxide layer on the oxide layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon; and

forming the dielectric layer over the nitridized oxide layer;

wherein upon exposing the dielectric layer to an oxidizing gas, the nitridized oxide layer inhibits oxidation of the polysilicon substrate.

80. (currently amended) A method of forming a dielectric layer, comprising the steps of:

thermally annealing a polysilicon substrate in nitric oxide to form an oxide layer on the polysilicon substrate;

annealing the oxide layer in a plasma generated nitrogen gas to nitridize the oxide layer to form a nitrided oxide layer on the oxide layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

forming the dielectric layer over the nitridized oxide layer; and

exposing the dielectric layer to an oxidizing gas;

whereupon the nitridized oxide layer inhibits oxidation of the polysilicon substrate.

81. (currently amended) A method of forming a dielectric layer, comprising the steps of:

thermally annealing a polysilicon substrate in nitric oxide to form an oxide layer on the polysilicon substrate; and

plasma annealing the oxide layer in a plasma generated nitrogen gas to form ~~a layer of oxynitride~~to form a nitride layer on the oxide layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

wherein upon forming the dielectric layer over the nitride~~oxynitride~~ layer, and exposing the dielectric layer to an oxidizing gas, the nitride~~oxynitride~~ layer inhibits oxidation of the polysilicon substrate.

82. (currently amended) A method of forming a dielectric layer, comprising the steps of:

thermally annealing a polysilicon substrate in nitric oxide to form an oxide layer on the polysilicon substrate;

plasma annealing the oxide layer in a plasma generated nitrogen gas to form a nitride layer on the oxide layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon ~~a layer of oxynitride~~; and

forming the dielectric layer over the nitride~~oxynitride~~ layer;

wherein upon exposing the dielectric layer to an oxidizing gas, the nitride~~oxynitride~~ layer inhibits oxidation of the polysilicon substrate.

83. (currently amended) A method of forming a dielectric layer, comprising the steps of:

thermally annealing a polysilicon substrate in the presence of nitric oxide at a temperature of less than about 800°C to form an oxide layer having a thickness of about 40 angstroms or less on the polysilicon substrate; and

annealing the oxide layer in a plasma generated nitrogen gas to nitridize the oxide layer to form a nitridized oxide layer on the oxide layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

wherein upon forming a high K dielectric layer over the nitridized oxide layer, and exposing the dielectric layer to an oxidizing gas, the nitridized oxide layer inhibits oxidation of the polysilicon substrate.

84. (currently amended) A method of forming a dielectric layer, comprising the steps of:

thermally annealing a polysilicon substrate in the presence of nitric oxide at a temperature of less than about 800°C to form an oxide layer having a thickness of about 40 angstroms or less on the polysilicon substrate;

annealing the oxide layer in a plasma generated nitrogen gas to nitridize the oxide layer to form a nitridized oxide layer on the oxide layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon; and

forming a high K dielectric layer over the nitridized oxide layer;

wherein upon exposing the high K dielectric layer to an oxidizing gas, the nitridized oxide layer inhibits oxidation of the polysilicon substrate.

85. (currently amended) A method of forming a dielectric layer, comprising the steps of:

thermally annealing a polysilicon substrate in the presence of nitric oxide at a temperature of less than about 800°C to form an oxynitride layer having a thickness of about 40 angstroms or less on the polysilicon substrate;

annealing the oxynitride layer to form a nitridized oxynitride layer on the oxynitride layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon in a plasma generated nitrogen gas to nitridize the oxynitride layer;

forming a high K dielectric layer over the nitridized oxynitride layer; and

annealing the high K dielectric layer in an oxidizing gas;

wherein the nitridized oxynitride layer inhibits oxidation of the polysilicon substrate.

86. (currently amended) A method of forming a dielectric layer, comprising the steps of:

thermally annealing a polysilicon substrate in the presence of nitric oxide at a temperature of less than about 800°C to form an oxynitride layer having a thickness of about 40 angstroms or less on the polysilicon substrate;

annealing the oxynitride layer in a plasma generated nitrogen gas to nitridize the oxynitride layer; the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon~~the nitrogen gas selected from the group consisting of nitrogen, ammonia, and nitrogen oxides~~;

forming a high K dielectric layer over the nitridized oxynitride layer; and

annealing the high K dielectric layer in an oxidizing gas;

wherein the nitridized oxynitride layer inhibits oxidation of the polysilicon substrate.

87. (currently amended) A method of forming a dielectric layer, comprising the steps of:

exposing a polysilicon substrate to nitric oxide at a temperature of less than about 800°C to form an oxynitride layer having a thickness of about 40 angstroms or less on the polysilicon substrate;

exposing the oxynitride layer to a plasma source of nitrogen to nitridize the oxynitride layer to form a nitridized oxynitride layer on the oxynitride layer, the plasma source of nitrogen comprises a plasma mixture of nitrogen and argon or a plasma mixture of nitrogen and helium;

forming a high K dielectric layer over the nitridized oxynitride layer; and

exposing the high K dielectric layer in an oxidizing gas;

wherein the nitridized oxynitride layer inhibits oxidation of the polysilicon substrate.

88. (canceled)

89. (currently amended) A method of forming a dielectric layer, comprising the steps of:

thermally annealing a polysilicon substrate in the presence of nitric oxide at a temperature of less than about 800°C to form an oxynitride layer having a thickness of less than about 15 angstroms on the polysilicon substrate;

annealing the oxynitride layer in a plasma generated nitrogen gas to nitridize the oxynitride layer to form a nitridized oxynitride layer on the oxynitride layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon; and

forming a high K dielectric layer over the nitridized oxynitride layer;

wherein upon exposing the high K dielectric layer to an oxidizing gas, the nitridized oxynitride layer inhibits oxidation of the polysilicon substrate.

90. (currently amended) A method of forming a dielectric layer, comprising the steps of:

thermally annealing a polysilicon substrate in the presence of nitric oxide at a temperature of less than about 800°C to form an oxynitride layer having a thickness of less than about 15 angstroms on the polysilicon substrate;

annealing the oxynitride layer in a plasma generated nitrogen gas to nitridize the oxynitride layer to form a nitridized oxynitride layer on the oxynitride layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

forming a high K dielectric layer over the nitridized oxynitride layer; and

annealing the high K dielectric layer in an oxidizing gas;

wherein the nitridized oxynitride layer inhibits oxygen diffusion into the polysilicon layer.

91. (currently amended) A method of forming a dielectric layer, comprising the steps of:

exposing a polysilicon substrate to nitric oxide at a temperature of less than about 800°C to form an oxynitride layer on the polysilicon substrate; and

exposing the oxynitride layer to a plasma generated nitrogen gas to nitridize the oxynitride layer to form a nitridized oxynitride layer on the oxynitride layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

wherein upon forming the dielectric layer over the nitridized oxynitride layer, and exposing the dielectric layer to an oxidizing gas, the nitridized oxynitride layer inhibits oxidation of the polysilicon substrate.

92. (currently amended) A method of forming a dielectric layer, comprising the steps of:

exposing a polysilicon substrate to nitric oxide at a temperature of less than about 800°C to form an oxynitride layer on the polysilicon substrate;

exposing the oxynitride layer to a plasma generated nitrogen gas to nitridize the oxynitride layer to form a nitridized oxynitride layer on the oxynitride layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon; and

forming the dielectric layer over the nitridized oxynitride layer;

wherein upon exposing the dielectric layer to an oxidizing gas, the nitridized oxynitride layer inhibits oxidation of the polysilicon substrate.

93. (currently amended) A method of forming a dielectric layer, comprising the steps of:

exposing a polysilicon substrate to nitric oxide at a temperature of less than about 800°C to form an oxynitride layer on the polysilicon substrate;

exposing the oxynitride layer to a plasma generated nitrogen gas to nitridize the oxynitride layer to form a nitridized oxynitride layer on the oxynitride layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

forming the dielectric layer over the nitridized oxynitride layer; and

exposing the dielectric layer to an oxidizing gas;

wherein the nitridized oxynitride layer inhibits oxidation of the polysilicon substrate.

94. (currently amended) A method of forming a dielectric layer, comprising the steps of:

exposing a polysilicon substrate to nitric oxide at a temperature of less than about 800°C to form an oxynitride layer having a thickness of less than about 40 angstroms on the polysilicon substrate; and

exposing the oxynitride layer to a plasma generated nitrogen gas to nitridize the oxynitride layer to form a nitridized oxynitride layer on the oxynitride layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

wherein upon forming a high K dielectric layer over the nitridized oxynitride layer; and exposing the high K dielectric layer to an oxidizing gas, the nitridized oxynitride layer inhibits oxidation of the polysilicon substrate.

95. (currently amended) A method of forming a dielectric layer in a capacitor container, the capacitor container comprising an opening in an insulative layer and a conductive polysilicon lower electrode disposed within the opening, the method comprising the steps of:

exposing the conductive polysilicon lower electrode to nitric oxide at a temperature of less than about 800°C to form an oxynitride layer having a thickness of less than about 15 angstroms on the polysilicon substrate;

exposing the oxynitride layer to a plasma generated nitrogen gas to nitridize the oxynitride layer to form a nitridized oxynitride layer on the oxynitride layer, the plasma

generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

forming a high K dielectric layer over the nitridized oxynitride layer; and

exposing the high K dielectric layer to an oxidizing gas;

wherein the nitridized oxynitride layer inhibits oxidation of the conductive polysilicon lower electrode.

96. (currently amended) A method of forming a capacitor, comprising the steps of:

forming a first electrode over a substrate, the first electrode comprising polysilicon;

exposing the first electrode to nitric oxide at a temperature of less than about 800°C to form an oxynitride layer thereon having a thickness of about 40 angstroms or less; and

exposing the oxynitride layer to a plasma generated nitrogen gas to nitridize the oxynitride layer to form a nitridized oxynitride layer on the oxynitride layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

wherein upon forming a high K dielectric layer over the nitridized oxynitride layer, and exposing the high K dielectric layer to an oxidizing gas, the nitridized oxynitride layer inhibits oxidation of the first electrode.

97. (currently amended) A method of forming a capacitor, comprising the steps of:

forming a first electrode over a substrate, the first electrode comprising polysilicon;

exposing the first electrode to nitric oxide at a temperature of less than about 800°C to form an oxynitride layer thereon having a thickness of about 40 angstroms or less;

exposing the oxynitride layer to a plasma generated nitrogen gas to nitridize the oxynitride layer to form a nitridized oxynitride layer on the oxynitride layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

forming a high K dielectric layer over the nitridized oxynitride layer; and

exposing the high K dielectric layer to an oxidizing gas;

wherein the nitridized oxynitride layer inhibits oxidation of the first electrode.

98. (currently amended) A method of forming a capacitor, comprising the steps of:

forming a first electrode over a substrate, the first electrode comprising polysilicon;

thermally annealing the first~~polysilicon~~ electrode in the presence of nitric oxide at a temperature of less than about 800°C to form an oxynitride layer thereon having a thickness of less than about 15 angstroms; and

annealing the oxynitride layer in a plasma generated nitrogen gas to nitridize the oxynitride layer to form a nitridized oxynitride layer on the oxynitride layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

wherein upon forming a high K dielectric layer over the nitridized oxynitride layer, and annealing the high K dielectric layer in an oxidizing gas, the nitridized oxynitride layer inhibits oxidation of the polysilicon electrode.

99. (currently amended) A method of forming a capacitor, comprising the steps of:

forming a first electrode over a substrate, the first electrode comprising polysilicon;

thermally annealing the first~~polysilicon~~ electrode in the presence of nitric oxide at a temperature of less than about 800°C to form an oxynitride layer thereon having a thickness of less than about 15 angstroms;

annealing the oxynitride layer in a plasma generated nitrogen gas to nitridize the oxynitride layer to form a nitridized oxynitride layer on the oxynitride layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

forming a high K dielectric layer over the nitridized oxynitride layer; and

annealing the high K dielectric layer in an oxidizing gas,

wherein the nitridized oxynitride layer inhibits oxidation of the polysilicon electrode.

100. (previously presented) The method of Claim 99, further comprising the step of forming a second electrode over the high K dielectric layer, the second electrode comprising a conductive material.

101. (previously presented) The method of Claim 99, wherein the first electrode comprises HSG polysilicon.

102. (previously presented) The method of Claim 100, wherein the second electrode comprises a conductive polysilicon or a conductive metal.

103. (previously presented) The method of Claim 102, wherein the second electrode comprises a conductive metal selected from the group consisting of tungsten, tungsten nitride, titanium nitride, and platinum.

104. (previously presented) The method of Claim 100, wherein the step of forming the second electrode comprises depositing the conductive material by chemical vapor deposition or physical vapor deposition.

105. (currently amended) A method of forming a capacitor, comprising the steps of:

providing a substrate, an overlying insulative layer, and a first electrode comprising polysilicon-within an opening extending through the insulative layer to the substrate;

exposing the first electrode to nitric oxide at a temperature of less than about 800°C to form an oxynitride layer thereon having a thickness of about 40 angstroms or less; and

exposing the oxynitride layer to a plasma generated nitrogen gas to nitridize the oxynitride layer to form a nitridized oxynitride layer on the oxynitride layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

wherein upon forming a high K dielectric layer over the nitridized oxynitride layer, and exposing the high K dielectric layer to an oxidizing gas, the nitridized oxynitride layer inhibits oxidation of the first electrode.

106. (currently amended) A method of forming a capacitor, comprising the steps of:

providing a substrate, an overlying insulative layer, and a first electrode comprising polysilicon-within an opening extending through the insulative layer to the substrate;

thermally annealing the first electrode in the presence of nitric oxide at a temperature of less than about 800°C to form an oxynitride layer thereon having a thickness of about 40 angstroms or less; and

annealing the oxynitride layer in a plasma generated nitrogen gas to nitridize the oxynitride layer to form a nitridized oxynitride layer on the oxynitride layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

wherein upon forming a high K dielectric layer over the nitridized oxynitride layer, and annealing the high K dielectric layer in an oxidizing gas, the nitridized oxynitride layer inhibits oxidation of the first electrode.

107. (currently amended) A method of forming a capacitor, comprising the steps of:

providing a substrate, an overlying insulative layer, and a first electrode comprising polysilicon an opening extending through the insulative layer to the substrate;

thermally annealing the first electrode in the presence of nitric oxide at a temperature of less than about 800°C to form an oxynitride layer thereon having a thickness of about 40 angstroms or less;

annealing the oxynitride layer in a plasma generated nitrogen gas to nitridize the oxynitride layer to form a nitridized oxynitride layer on the oxynitride layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

forming a high K dielectric layer over the nitridized oxynitride layer;

annealing the high K dielectric layer in an oxidizing gas, wherein the nitridized oxynitride layer inhibits oxidation of the first electrode; and

forming a second electrode over the high K dielectric layer, the second electrode comprising a conductive material.

108. (currently amended) A method of forming a capacitor, comprising the steps of:

providing a substrate with an overlying insulative layer and an opening extending through the insulative layer to the substrate;

forming a first electrode comprising polysilicon-within the opening;

exposing the first electrode to nitric oxide at a temperature of less than about 800°C to form an oxynitride layer thereon having a thickness of about 40 angstroms or less; and

exposing the oxynitride layer to a plasma generated nitrogen gas to nitridize the oxynitride layer to form a nitridized oxynitride layer on the oxynitride layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

wherein upon forming a high K dielectric layer over the nitridized oxynitride layer, and exposing the high K dielectric layer to an oxidizing gas, the nitridized oxynitride layer inhibits oxidation of the first electrode.

109. (currently amended) A method of forming a capacitor, comprising the steps of:

providing a substrate with an overlying insulative layer and an opening extending through the insulative layer to the substrate;

forming a first electrode comprising polysilicon-within the opening;

thermally annealing the first electrode in the presence of nitric oxide at a temperature of less than about 800°C to form an oxynitride layer thereon having a thickness of about 40 angstroms or less; and

annealing the oxynitride layer in a plasma generated nitrogen gas to nitridize the oxynitride layer to form a nitridized oxynitride layer on the oxynitride layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

wherein upon forming a high K dielectric layer over the nitridized oxynitride layer, and annealing the high K dielectric layer in an oxidizing gas, the nitridized oxynitride layer inhibits oxidation of the first electrode.

110. (currently amended) A method of forming a capacitor, comprising the steps of:

providing a substrate with an overlying insulative layer and an opening extending through the insulative layer to the substrate;

forming a first electrode comprising polysilicon within the opening;

thermally annealing the first electrode in the presence of nitric oxide at a temperature of less than about 800°C to form an oxynitride layer thereon having a thickness of about 40 angstroms or less;

annealing the oxynitride layer in a plasma generated nitrogen gas to nitridize the oxynitride layer to form a nitridized oxynitride layer on the oxynitride layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

forming a high K dielectric layer over the nitridized oxynitride layer;

annealing the high K dielectric layer in an oxidizing gas, wherein the nitridized oxynitride layer inhibits oxidation of the first electrode; and

forming a second electrode over the high K dielectric layer, the second electrode comprising a conductive material.

111-113. (canceled)

114. (previously presented) The method of Claim 2, wherein the step of nitridizing the oxynitride layer is at a temperature of up to about 900°C.

115. (currently amended) The method of Claim 2, wherein the oxynitride layer and the nitride layer have a combined thickness of about 10 to about 40 angstroms.

116. (previously presented) The method of Claim 2, wherein the dielectric layer comprises a high K dielectric.

117. (currently amended) The method of Claim 116, wherein the dielectric layer comprises the a high K dielectric selected from the group consisting of tantalum pentoxide, titanium

dioxide, barium strontium titanate, strontium titanate, barium titanate, lead zirconium titanate, strontium bismuth tantalate, hafnium oxide, zirconium oxide, and aluminum oxide.

118. (previously presented) The method of Claim 116, wherein the dielectric layer comprises tantalum pentoxide.

119. (previously presented) The method of Claim 2, further comprising, after the step of depositing the dielectric layer, annealing the dielectric layer in an oxidizing gas.

120. (previously presented) The method of Claim 119, wherein the oxidizing gas is selected from the group consisting of oxygen, plasma oxygen, ozone, nitrous oxide, and mixtures thereof.

121. (previously presented) The method of Claim 119, wherein the oxidizing gas comprises a plasma oxygen.

122. (previously presented) The method of Claim 119, wherein the oxynitride layer has a thickness that is substantially the same before and after the step of annealing the dielectric layer.

123. (canceled)

124. (previously presented) The method of Claim 2, wherein the polysilicon substrate comprises HSG polysilicon.

125. (canceled)

126. (previously presented) The method of Claim 2, wherein the polysilicon substrate is situated within an opening in an insulative layer.

127. (currently amended) The method of Claim 2, further comprising, prior to the step of annealing the polysilicon substrate, ~~the steps of~~ forming an opening in an insulative layer, and forming the polysilicon substrate as a fill within the opening.

128. (currently amended) The method of Claim 2, further comprising, prior to the step of annealing the polysilicon substrate, ~~the steps of~~ forming the polysilicon substrate over a substrate.

129. (previously presented) The method of Claim 128, wherein the polysilicon substrate comprises a capacitor electrode.

130. (currently amended) The method of Claim 2, further comprising, prior to the step of annealing the polysilicon substrate, ~~the step of~~ providing a substrate comprising an overlying insulative layer, an opening formed in the insulating layer, and the polysilicon substrate formed as a fill within the opening.

131. (currently amended) The method of Claim 2, further comprising, prior to the step of annealing the polysilicon substrate, ~~the step of~~ providing a substrate with an overlying insulative layer and one or more openings in the insulative layer extending to the substrate, and the polysilicon substrate as a fill within the one or more openings.

132. (currently amended) The method of Claim 2, further comprising, prior to the step of annealing the polysilicon substrate, ~~the steps of~~ providing a substrate comprising an opening, and forming the polysilicon substrate as a first conductive electrode layer within the opening, the polysilicon substrate, comprising hemispherical grain polysilicon.

133. (currently amended) The method of Claim 132, further comprising ~~the step of~~ forming a second conductive electrode layer over the dielectric layer.

134. (previously presented) The method of Claim 133, wherein the second conductive electrode layer comprises a conductive metal.

135. (previously presented) The method of Claim 134, wherein the second conductive electrode layer comprises a conductive polysilicon..

136. (previously presented) The method of Claim 134, wherein the second conductive electrode layer comprises a conductive metal selected from the group consisting of tungsten, tungsten nitride, titanium nitride, and platinum.

137. (previously presented) The method of Claim 133, wherein the step of forming the second conductive electrode layer comprises depositing a conductive material by chemical vapor deposition or physical vapor deposition.

138. (previously presented) The method of Claim 2, wherein the dielectric layer comprises an insulating inorganic metal oxide material.

139. (previously presented) The method of Claim 136, wherein the dielectric layer comprises a high K dielectric.

140. (previously presented) The method of Claim 2, wherein the step of annealing comprises thermally annealing the polysilicon substrate.

141-143. (canceled)

144. (canceled)

145. (currently amended) The method of Claim 2, wherein the step of annealing forms the ~~an~~ oxynitride layer having a thickness of about 40 angstroms or less.

146. (currently amended) The method of Claim 2, wherein the step of annealing forms the ~~an~~ oxynitride layer having a thickness of less than about 15 angstroms.

147. (previously presented) The method of Claim 2, wherein the nitridized oxynitride layer is effective to inhibit oxidation of the polysilicon substrate.

148. (currently amended) A method of forming a dielectric layer, comprising the steps of:

annealing a polysilicon substrate in nitric oxide at a temperature of less than 800°C to form an oxide layer on the polysilicon substrate;

nitridizing the oxide layer after the step of annealing~~the annealed polysilicon layer~~ in a plasma generated nitrogen gas to form a silicon nitride layer on the oxide layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon; and

depositing the dielectric layer onto the silicon nitride layer.

149. (currently amended) A method of forming a dielectric layer, comprising the steps of:

annealing a polysilicon substrate in nitric oxide at a temperature of less than 800°C to form an oxide layer on the polysilicon substrate;

nitridizing the oxide layer after the step of annealing~~the annealed polysilicon layer~~ in a plasma generated nitrogen gas to form a silicon nitride layer on the annealed polysilicon layer, the plasma generated nitrogen gas selected from the group consisting of a plasma mixture of nitrogen and helium and a plasma mixture of nitrogen and argon;

depositing the dielectric layer onto the silicon nitride layer; and

exposing the dielectric layer to an oxidizing gas, wherein oxidation of the polysilicon substrate~~layer~~ is inhibited.

150. (previously presented) The method of Claim 2, wherein the nitride layer is about 5 to about 15 angstroms thick.

151. (previously presented) The method of Claim 2, wherein the oxynitride layer and the nitride layer have a combined thickness of about 10 to about 30 angstroms.

152. (previously presented) The method of Claim 2, wherein the step of nitridizing comprises exposing the oxynitride layer to a remote plasma source of nitrogen.

153. (previously presented) The method of Claim 2, further comprising saturating the dielectric layer with oxygen.

154. (previously presented) The method of Claim 153, wherein the step of saturating comprises subjecting the dielectric layer to an anneal in the presence of an oxidizing gas.

155. (previously presented) The method of Claim 154, wherein the oxygen anneal comprises annealing with one or more of oxygen, plasma oxygen, ozone, and nitrous oxide.

156. (previously presented) The method of Claim 2, further comprising depositing a conductive material over the dielectric layer.

157. (previously presented) The method of Claim 156, wherein the conductive material is selected from the group consisting of doped polysilicon, tungsten, tungsten nitride, titanium nitride, and platinum.